

Abstract

Manatee vocalizations are detected by performing a variety of frequency domain processing operations on sound signals detected in an underwater region. Overlapping time windowed portions of digitized sound data are converted to the frequency domain where power spectrums therefor are estimated. Each such power spectrum is then normalized with each resulting normalized spectrum value indicative of broadband noise having a value that is less than a normalized spectrum value indicative of narrowband tones. Normalized spectrum values indicative of narrowband tones that occur (i) in windows of frequency bins encompassing frequencies lower and higher than each of a lowest resonant frequency (associated with manatee vocalizations) and its harmonics and (ii) with a specified degree of variance with respect to frequency separation therebetween, are filtered out. Remaining normalized spectrum values indicative of narrowband tones are assigned to a frequency-based harmonic set. A scoring routine is applied that uses the normalized spectrum values in each harmonic set. A manatee vocalization is indicated when a threshold score is achieved across at least a portion of the overlapping time-windowed portions.